

APPENDIX A

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IF (it is time to perform housekeeping activities) THEN
  FOR (each TCP connection that has started to close, i.e. observed the TCP FIN flag set) DO
    IF (the time allowed for closure has passed) THEN
      Close this connection
    IF (this is the last connection with this user) THEN
      Reinitialize the user's profile and set the profile state to Incomplete
    ENDF
  ENDF
NEXT

FOR (each connection that has been idle for the maximum allowed time) DO
  Close this connection
  IF (this is the last connection with this user) THEN
    Reinitialize the user's profile and set the profile state to Incomplete
  ENDF
NEXT
ENDIF

IF (it is an IP packet) THEN
  IF (it is an IP/UDP packet) THEN
    Check the source and destination ports against a list of allowed well-known UDP ports
  IF (either port is on the allowed port list) THEN
    IF (the server port is for the XDMCP protocol) THEN
      Check the XDMCP Opcode against a list of allowed opcodes
    IF (the XDMCP Opcode is on the allowed opcode list) THEN
      Check if the XDMCP packet is being sent in an allowed direction
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IF (an allowed Opcode is being sent to the server or an allowed Opcode is being sent to the user)
THEN
    IF (there is an established X-Windows connection with this user) THEN
        IF (the Opcode is other than KeepAlive or Alive) THEN
            Discard the packet
        ENDIF
    ELSE
        IF (the Opcode is KeepAlive or Alive) THEN
            Discard the packet
        ENDIF
    ENDIF
ENDIF

Create and initialize a profile for this user

Set the profile state to Incomplete

IF (the Opcode is Query) THEN
    Reinitialize the user's profile and set the profile state to Incomplete

    FOR (each Authentication Name in the packet) DO
        IF (the Authentication Name is not recognized) THEN
            Discard the packet
        ENDIF
    NEXT

    Remember the Authentication Names in the user's profile

ELSE IF (the Opcode is Willing) THEN
    IF (the Authentication Name in the packet is not recognized) THEN
        Discard the packet
    ENDIF

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IF (the Authentication Name is not one of the authentication names recorded in the user's profile from the Query packet) THEN
 Discard the packet
ENDIF

Remember this Authentication Name in the user's profile

IF (the Hostname supplied by the server is NOT syntactically valid) THEN
 Discard the packet
ENDIF

IF (the Status string is NOT composed of printable characters) THEN
 Discard the packet
ENDIF

ELSE IF (the Opcode is Unwilling) THEN

 IF (the Hostname supplied by the server is NOT syntactically valid) THEN
 Discard the packet
 ENDIF

 IF (the Status string is NOT composed of printable characters) THEN
 Discard the packet
 ENDIF

 Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the Opcode is Request) THEN

 IF (the X Display Number is invalid) THEN
 Discard the packet
 ENDIF

Remember this Display Number in the user's profile

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FOR (each Connection Type in the packet) DO
 IF (the Connection Type is not IP) THEN
 Discard the packet

 ENDIF

NEXT

FOR (each Connection Address in the packet) DO
 IF (the Connection Address is not an IP address) THEN
 Discard the packet

 ENDIF

 IF (the Connection Address does not match the user's IP address) THEN
 Replace the Connection Address with the user's IP address

 ENDIF

NEXT

IF (none of the Connection Addresses matched the user's IP address) THEN
 Discard the packet

ENDIF

IF (the Authentication Name in the packet is not recognized) THEN
 Discard the packet

ENDIF

IF (the Authentication Name does not match the Authentication Name recorded in
the user's profile from the Willing packet) THEN

 Discard the packet

ENDIF

IF (the lengths of the Authentication Name and Authentication Data are not both
zero or non-zero) THEN

 Discard the packet

ENDIF

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FOR (each Authorization Name in the packet) DO
  IF (the Authorization Name is not recognized) THEN
    Discard the packet
  ENDF
NEXT

Remember the Authorization Names in the user's profile

IF (if the Manufacturer Display ID contains invalid characters) THEN
  Discard the packet
ENDIF

IF (if the Manufacturer Display ID does not match any previous recorded Display
ID for this user) THEN
  Discard the packet
ENDIF

ELSE IF (the opcode is Accept) THEN
  Remember the Session ID in the user's profile

  IF (the Authentication Name in the packet is not recognized) THEN
    Discard the packet
  ENDF

  IF (the Authentication Name does not match the Authentication Name recorded in
the user's profile from the Request packet) THEN
    Discard the packet
  ENDF

  IF (the lengths of the Authentication Name and Authentication Data are not both
zero or non-zero) THEN
    Discard the packet
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ENDIF

IF (the Authorization Name in the packet is not recognized) THEN
 Discard the packet

ENDIF

IF (the Authorization Name does not match any of the Authorization Names
 recorded in the user's profile from the Request packet) THEN
 Discard the packet

ENDIF

Remember the Authorization Name in the user's profile

IF (the lengths of the Authorization Name and Authorization Data are not both
 zero or non-zero) THEN

 Discard the packet

ENDIF

ELSE IF (the opcode is Decline) THEN

 IF (the Status string is NOT composed of printable characters) THEN
 Discard the packet

ENDIF

IF (the Authentication Name in the packet is not recognized) THEN
 Discard the packet

ENDIF

IF (the Authentication Name does not match the Authentication Name recorded in
 the user's profile from the Request packet) THEN
 Discard the packet

ENDIF

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IF (the lengths of the Authentication Name and Authentication Data are not both zero or non-zero) THEN
 Discard the packet
ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the opcode is Manage) THEN

 IF (the Session ID does not match the Session ID recorded in the user's profile from the Accept packet) THEN
 Discard the packet
 ENDIF

 IF (the X Display Number is invalid) THEN
 Discard the packet
 ENDIF

 IF (the Display Number does not match the Display Number recorded in the user's profile from the Request packet) THEN
 Discard the packet
 ENDIF

 IF (if the Display Class contains invalid characters) THEN
 Discard the packet
 ENDIF

 IF (if the Display Class does not match any previous recorded Display Class for this user) THEN
 Discard the packet
 ENDIF

Set the user's profile state to Complete

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ELSE IF (the opcode is Refuse) THEN
  IF (the Session ID does not match the Session ID recorded in the user's profile
    from the Accept packet) THEN
    Discard the packet
  ENDIF
ENDIF

ELSE IF (the opcode is Failed) THEN
  IF (the Session ID does not match the Session ID recorded in the user's profile
    from the Accept packet) THEN
    Discard the packet
  ENDIF
ENDIF

IF (the Status string is NOT composed of printable characters) THEN
  Discard the packet
ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the opcode is KeepAlive) THEN
  IF (the X Display Number is invalid) THEN
    Discard the packet
  ENDIF
ENDIF

IF (the Display Number does not match the Display Number recorded in the user's
  profile from the Manage packet) THEN
  Discard the packet
ENDIF

IF (the Session ID does not match the Session ID recorded in the user's profile
  from the Manage packet) THEN
  Discard the packet
ENDIF
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ELSE IF (the opcode is Alive) THEN
    IF (the Session Running flag is not 0 or 1) THEN
        Discard the packet
    ENDIF

    IF (the Session Running flag is True) THEN
        IF (the Session ID does not match the Session ID recorded in the user's
            profile from the Manage packet) THEN
            Discard the packet
        ENDIF
    ELSE -- the Session Running flag is False
        IF (the Session ID is not zero) THEN
            Discard the packet
        ENDIF

        Reinitialize the user's profile and set the profile state to Incomplete
    ENDIF

    ELSE -- the XDMCP Opcode is not allowed
        Discard the packet
    ENDIF

    ELSE -- the XDMCP Opcode is being sent in the wrong direction
        Discard the packet
    ENDIF

    ELSE -- the XDMCP Opcode is not on the allowed-opcodes list
        Discard the packet
    ENDIF

    ELSE -- the server port is not for the XDMCP protocol
        Discard the packet
    ENDIF

    ELSE -- neither of the IP ports are on the allowed-ports list
        Discard the packet
    ENDIF

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ELSE IF (it is an IP/TCP packet) THEN
  IF (this packet is for an established TCP connection) THEN
    IF (the TCP RST flag is set) THEN
      Close this connection immediately
    IF (this is the last connection with this user) THEN
      Reinitialize the user's profile and set the profile state to Incomplete
    ENDIF
  ELSE IF (the TCP FIN flag is set for the first time for this connection) THEN
    Remember that the FIN flag was set in the user's profile
    Record that the FIN flag was observed at the current date/time
  ENDIF
ELSE -- the packet is not for an established TCP connection
  IF (the packet TCP SYN flag is set and the TCP ACK flag is not set) THEN
    Check the source and destination ports against a list of allowed well-known TCP ports
  IF (either port is on the allowed port list) THEN
    Check if the TCP connection is being opened in an allowed direction, i.e. the SYN packet is from
    the server to an allowed user port or from the user to an allowed server port
  IF (the TCP connection is being opened in an allowed direction) THEN
    Check if the user port is for the X-Windows protocol
  IF (this is an X-Windows connection) THEN
    IF (there is not an existing profile for this user) THEN
      Discard the packet
    ELSE -- there is an existing profile for this user
      IF (the state of the user's profile is not Complete) THEN
        Discard the packet
      ENDIF
    ENDIF
  ENDIF
ENDIF
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IF (the user port does not correspond to the X Display Number in the
user's profile) THEN

Discard the packet

ENDIF

ENDIF

ENDIF

Remember this connection in the user's profile

ELSE – the TCP connection is being opened in a disallowed direction

Discard the packet

ENDIF

ELSE – neither of the IP ports are on the allowed-ports list

Discard the packet

ENDIF

ELSE – this is not a TCP SYN packet

Discard the packet

ENDIF

ENDIF

Remember the current date/time as that of the last packet on this connection

ELSE – it is neither and IP/UDP or IP/TCP packet

Discard the packet

ENDIF

ELSE – it is a non-IP packet

Discard the packet

ENDIF

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